

86
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REPORTS

TO THE

LOCAL GOVERNMENT BOARD

ON

PUBLIC HEALTH AND MEDICAL SUBJECTS.

(*NEW SERIES No. 44.*)

Dr. R. Deane Sweeting's Report to the Local Government Board on the sanitary circumstances and administration of the Crickhowell Rural District, with especial reference to the prevalence of Enteric Fever in the Parish of Llanelly, Breconshire.



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Dr. R. Deane Sweeting's Report to the Local Government Board on the sanitary circumstances and administration of the Crickhowell Rural District, with especial reference to the prevalence of Enteric Fever in the Parish of Llanelly, Breconshire.

ARTHUR NEWSHOLME,

Medical Officer,

8th December, 1910.

The Crickhowell Rural District, in the Crickhowell Union and Registration District, is situated in the extreme south-east of Brecknockshire, adjacent to Monmouthshire. It is bounded on the north by Hay Rural District, on the west by Brecknock Rural District, on the east by Abergavenny Rural District, and on the south from east to west by the Blaenavon, Nantyglo and Blaina, Brynmawr, Ebbw Vale, Tredegar, and Rhymney Urban Districts.

The area of the district is 46,185 acres. The number of inhabited houses was, in 1881, 1,732; in 1891, 1,708; in 1901, 1,654. The population was, in 1881, 7,710; in 1891, 7,464; in 1901, 7,115. There has been, therefore, a gradual, but tolerably regular, diminution of inhabited houses and population in the two decades from 1881 to 1901.

There are ten contributory places or parishes in the district, the area, number of inhabited houses, and population of which in 1891 and 1901 are given in the following Table (A).

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Table A.—Crickhowell Rural District, shewing, for each parish, the area, number of inhabited houses and population in 1891 and 1901.

Name of Parish.	Area in Statute Acres.	Inhabited Houses.		Population.	
		1891.	1901.	1891.	1901.
Crickhowell	1,959	298	288	1,246	1,150
Grwyne fawr	1,124	4	2	24	12
Grwyne fechan	3,913	9	9	54	54
Llanbedr Ystradwy	3,814	46	46	230	204
Llanelly	4,542	718	697	3,079	3,076
Llanfihangel, or Saint Michael Cwm Dû.	9,930	201	200	850	826
Llangattock	8,171	207	198	968	924
Llangenau	2,817	98	83	471	347
Llangynidr... ..	8,436	115	122	488	479
Patricio	1,479	12	9	54	43
Totals	46,185	1,708	1,654	7,464	7,115

Of these, the most considerable in population are Llanelly, Crickhowell, and Llangattock. Llanelly contains several considerable aggregations of population at Gilwern, Maes-y-gwartha, Clydach, Cheltenham and Blackrock, and is largely urban in character. Crickhowell includes a compact town of the same name, and Llangattock a fair sized village. The rest of the district is almost entirely rural, the villages in it, *e.g.* Llanbedr and Llangynidr being small and unimportant.

The river Usk traverses the district from west to east, the land rising on each side of it to a considerable height. An important tributary of this river, the Clydach brook, rising in the vicinity of Brynmawr, passes through Llanelly parish to join the Usk near Gilwern.

The Monmouthshire and Brecon canal runs through a portion of the district from east to west.

Geologically, the greater part of the district is on the Old Red Sandstone; but the southern portion, including the Clydach valley in Llanelly parish, is placed on the Coal Measures and Carboniferous limestone, between which is a stratum of Millstone Grit. A considerable patch of river alluvium occupies the centre of the district, following the course of the river Usk.

The chief occupations, besides agriculture, are coal-mining and limestone quarrying. There are also a few paper mills in the district.

The rateable value is £40,456; a penny in the £ produces £169.

The district has been several times visited by Inspectors of the Central Health Authority. Thus in 1872, the late Dr. Gwynne Harries reported upon "The prevalence of Enteric Fever in part of the sub-district of Llanelly, Brecknockshire." In 1876 the late Dr. Blaxall re-visited and reported upon this sub-district with reference to an epidemic at Darenvelling. The late Mr. Spear in 1886 and Dr. Maclean Wilson in 1894 inspected the district in

connection with the Cholera Surveys of those years. In 1900 Dr. Wheaton reported upon an outbreak of diphtheria at Llangattock. Finally, in 1901, Dr. Reece and Mr. Sandford Fawcett reported upon "The alleged injurious influence of the Brynmawr Urban District Council's sewage works on the health of the Parish of Llanelly, in the Crickhowell Rural District, through pollution of local water supplies." I shall refer later to this report in dealing with the recent prevalence of Enteric Fever in the parish of Llanelly.

SANITARY CIRCUMSTANCES.

Roads.—There are 150 miles of roads, all dedicated, in the district. On the whole they are in good condition and clean.

Dwellings.—These are usually of brick and slated. A few thatched cottages remain. Many of the older houses are built up against the hillside, and are for this reason damp. Some of the newer dwellings are deficient in eavesputting, and hence liable to dampness. Leaking roofs and dilapidated ceilings walls and floors are found at a considerable number of cottages in the district. Some have narrow curtilages : a few are back to back. Crowding on area does not exist to a marked extent, and is being diminished by demolitions. There is some tendency to overcrowding of persons, but it is carefully kept in check. Paving is defective in the back yards of many houses in the semi-urban portions.

On the whole, the condition of the working-class house accommodation leaves a good deal to be desired. Only two houses have been closed under the Housing of the Working Classes Act (1890). Since the passing of the recent Housing, &c. Act, the medical officer of health has made urgent representations to the district council with regard to certain dwellings.

Water supply.—Though there are still a few dip wells and roadside spouts remaining, many of which are in positions suggesting contamination, most places in the district are supplied with water from tanks or reservoirs, impounding spring or surface water, chiefly the former. Mains are led from these receptacles to standtaps. The chief service reservoirs are at Llangattock (10,000 gallons) ; at Maes-y-Gwartha (1,000 gallons), constructed out of loan sanctioned by the Board in 1877, and reconstructed in 1907 ; at Crickhowell (86,000 gallons), constructed out of similar loan in 1887 ; and the Brunant reservoir at Clydach (12,000 gallons), constructed out of similar loan in 1907.

Of the springs, Ffynnon-y-coed spring at Cheltenham in Llanelly parish (to be referred to later) is arched over and covered in by brickwork : its water is led to standtaps in the roadside. It has a considerable distribution in Cheltenham and Clydach. Some of the springs, as at Llanbedr, are inaccessible in position.

At Crickhowell town there has been some waste of water of late, due to defective house fittings ; but these are being gradually overhauled and repaired by the surveyor.

Sewerage and Sewage disposal.—Crickhowell town is the only sewered part of the district. Here 6-in. branch and 9-in. main earthenware pipes converge to two outfalls. Ventilation is by an open grating at one of the manholes, and is inadequate. There is

no flushing except by a penstock at one place ; but a good gradient atones largely for this deficiency.

Surface water is dealt with in a separate system of pipes, leading to ditches and streams.

Disposal of the sewage is effected at two outfalls—"Orchard" and "Garn," both of which discharge into the river Usk. The "Orchard" outfall serves the central and northern portions of the town, viz., some 160 houses and 640 population. Two sewers convey the sewage to two tanks (combined capacity 4,500 gallons), and a filter of blast furnace slag (80 cubic yards). The tanks are loosely covered by boards. There is no proper removal of sludge, scum only being removed from time to time. A 9-in. pipe, on which are placed two inspection manholes, conveys the effluent direct to the river Usk. At my visit, sewage was escaping from the last man-hole, and the Usk at the outlet was very turbid.

The "Garn" outfall, placed on the north bank of the Usk, serves the southern portion of the town, viz., about 120 houses and 480 population. Two sewers converge to three tanks (combined capacity 8,000 gallons), and two small filters of furnace clinker (25 cubic yards), from which the effluent, which is foul and fetid, passes direct to the Usk, rendering this highly turbid and offensive. During floods, the river covers part of the outfall works. Both these outfalls are highly unsatisfactory, especially the latter. At the "Orchard" outfall, the tank accommodation and filtration are inadequate. The "Garn" outfall is practically valueless as a means of treating sewage. Both effluents are bad.

The rural district council passed in April of this year and forwarded to the Board a resolution to improve the sewage outfalls, and to prepare a scheme for submission to the Board. This resolution was demanded by the Board before the issue of an Order in May, declaring sewage disposal expenses at Crickhowell to be "special." Nothing definite in the way of improving these outfalls has yet been done.

Sewerage is required for Llangattock village, where house slops pass either direct into the stream there, or to highway surface drains ; for the populated portions of Llanelly parish, as at Gilwern, where there are foul open gutters at the side of the road and some drains pass underneath houses, as well as direct passage of slop water to the brook ; at Clydach, where slop water similarly passes to the brook and to fields, and slop nuisances of various kinds abound ; at Cheltenham, where foul water-closet contents are flushed out to fields ; and at various outlying aggregations of dwellings on the hills overlooking the Clydach valley, as at Gellifelen, where similar slop nuisances are to be found. A central sewer for parts of Llanelly parish, with proper disposal works, seems quite feasible, but the question should be referred to a competent engineer.

Excrement disposal.—This is chiefly effected by privies with pits, which are usually mere holes in the ground, covered by boards or by loose stones ; but in some instances the privies are connected with middens in which ashes and excrement mingle together. Many privies are foul, and some are placed on the banks of streams into which their contents fall or are washed.

I saw several overfull pail-closets at Llangattock village: there is need for scavenging of their contents there, as many of the curtilages are narrow and there is no room for disposal of excrement. Conversion of privies into water-closets has been slow except at Crickhowell, which is now almost entirely a water-closet town, few privies remaining; but some of the water-closets are in a dilapidated state. All the water-closets there are provided with cisterns, mostly of two gallons capacity. The majority of the other water-closets, scattered throughout the district, are hand-flushed, and the pans of most of them are foul. Few cesspools exist, and those seen were usually overflowing and in a foul state.

Refuse disposal.—The rural district council contract for the removal of house refuse at Crickhowell, Llangattock and Llanelly. At Crickhowell, refuse is now removed in pails twice a week by the contractor, for 6s. 6d. a week or £16 18s. a year. There is a satisfactory tip half a mile out of the town in an old quarry, for which £2 10s. yearly rent is paid, charged to the scavenging account. At Llangattock village, the council have provided an uncovered ashpit for the reception of refuse, which is removed by the contractor when required at 30s. a year. For Llanelly parish, the council have provided eight similar ashpits, viz.: two at Blackrock, two at Cheltenham, one at Llanelly Hill, and one at Gilwern. Refuse from these ashpits is removed by contractors, respectively for Blackrock and Clydach at £13 4s. a year, for Llanelly Hill at £3 a year and Gilwern at 7s. 6d. a day, averaging £4 10s. a year. Each of these contractors finds his own tip. I was not altogether satisfied with these arrangements. Most of the ashpits are too large and should be covered; they do not appear to be scavenged as regularly as they might be, though the council have appointed a "foreman scavenger" (who is in reality a kind of assistant inspector of nuisances) at £48 15s. a year for the parish of Llanelly. I understand that he is chiefly concerned with seeing to the emptying of privies. It would in my opinion be better if the council undertook the duty of scavenging themselves in these places and did not let it to contractors. The surveyor and his foreman would have a more free hand in dealing with public scavenging in this parish and at Llangattock village. Thus, the ashpits provided by the council fail at some places to serve their purpose, inasmuch as much refuse is found dumped on the ground close to them, *e.g.*, at Wannlapria in Llanelly parish and at Llangattock village.

It is common for ashes and refuse to be dumped on the banks of streams. This is especially the case with regard to the Clydach brook running through Llanelly parish, to be afterwards referred to.

Much refuse and manure is littered about some of the villages, where a system of public scavenging by the council might be introduced with advantage.

By an Order dated May 27th, 1910, the Board invested the rural district council as regards the contributory places of Llanelly and Llangattock with urban powers under section 39 of the Public Health Act, 1875, and as regards the contributory place of Crickhowell with similar powers under section 45 of the same Act. The expenses for these purposes were declared "special,"

as well as those connected with sewage disposal and the removal of house refuse in Crickhowell. The remuneration of the assistant inspector in charge of the scavenging in Llanelly was also declared to be "special expenses."

Regulated trades.—There are two common lodging-houses, which are registered but unregulated by bye-laws : their condition on the whole is satisfactory ; but the rooms require to be furnished with cards indicating the number of persons for which each room is intended.

There are four slaughter-houses, all registered. They are as a rule badly drained : some of them are badly placed.

There are twenty-one registered dairies and cowsheds. Nearly all the cowsheds are dirty, badly paved, ill-ventilated and inefficiently drained. Some of the dairies serve as larders. Regulations for dairies, &c., under the Order of 1885, were drawn up in 1907, and are based on the Board's model. They are very inadequately carried out.

There are ten registered bakehouses, some of which require attention as to cleanliness and proper through ventilation.

SANITARY ADMINISTRATION.

The rural district council consists of eighteen members, who meet every month. There is no sanitary or public health committee ; but a special committee is annually appointed to deal with water-supply in Llanelly parish.

Mr. Irvine Blennerhassett is clerk at a salary of £45 a year. He is also clerk to the Guardians, and to the Assessment and Education Committees.

Mr. P. E. Hill, M.R.C.S., L.S.A., is medical officer of health at a salary of £50 a year, half repaid by the county council. He is also district medical officer and public vaccinator for the Crickhowell District of the Crickhowell Union ; medical officer to Crickhowell Workhouse : and surgeon to the County Police.

Though somewhat advanced in years, *Mr. Hill* is active and has a good knowledge of his district. His books are well kept and he makes elaborate annual and special reports to the council.

Mr. F. J. Hurley is inspector of nuisances at £60 a year, half repaid by the county, in addition to surveyor of highways at £100. *Mr. Hurley* has the certificate of the Royal Sanitary Institute.

He is on the whole a competent officer. But the proportion of statutory and preliminary notices served by him, when compared with the number of visits paid by him to premises, is very small, and having regard to the character of the district is quite inadequate. Greater activity is required in this respect, especially with regard to notices for conversion of privies. Of late years, he has devoted a great deal of his time to Llanelly parish, owing to the large amount of necessary work there. But he has not neglected the other parts of the district, with which, however, he is not so well acquainted as with Llanelly parish. It seems to me that an inspector is needed for Llanelly parish alone, in which case

Mr. Hurley could undertake this duty, as well as that of surveyor, and an additional inspector could supervise the remainder of the district. But an even better result might be obtained by having a whole time inspector for the whole district and separating this post from that of surveyor.

Bye-laws with respect to scavenging and slaughter-houses were sanctioned by the Board on April 8th, 1908; with respect to Nuisances and New Streets and Buildings on May 18th, 1908.

Adoptive Acts.—The Infectious Disease (Prevention) Act, 1890, was adopted in 1907. The Public Health Acts Amendment Act, 1890, has not been adopted.

Chicken-pox and Cerebro-spinal Meningitis were at one time added to the schedule of the Infectious Disease (Notification) Act, 1889; but the addition has since been revoked. No other diseases are now added.

Hospital and disinfection.—There is no hospital at all in the district, though home isolation of infectious diseases is quite futile in the great majority of dwellings.

Under the superintendence of Mr. Hurley, rooms are fumigated with formaldehyde vapour, after the occurrence of infection, and liquid formalin is used for washing woodwork and floors. But there is no apparatus in use for the efficient dealing with infected clothing and bedding and personal belongings.

Canal Boats.—A few barges, diminishing in number, ply on the Monmouth and Brecon Canal. They appear to be effectually dealt with under the Public Health and Canal Boats Acts.

ENTERIC FEVER IN LLANELLY PARISH.

This is the most populous parish in the Crickhowell Rural District, and is placed in the extreme south, east of and adjacent to Brynmawr Urban District.

A large part of it is really urban, comprising not only the more or less dense localities above mentioned, which are situated on the banks of the Clydach brook, but also numerous detached rows of cottages (mostly inhabited by colliers and quarrymen), placed on the hills overlooking the Clydach valley. Many of the dwellings in the parish are structurally dilapidated, damp, and badly ventilated. Water is mostly from springs, of which the chief named are Ffynnon-y-coed at Cheltenham, Brunant at Clydach, and Maes-y-gwartha at the place of that name. But there are numerous other (unnamed) local springs, and a few dip wells. There is no sewerage at all; and house drainage, when present, is primitive and inadequate. Slop-water nuisances abound in the parish. Many of the pit privies, too, are foul and overfull, though they are now better scavenged than formerly, through the instrumentality of the "foreman scavenger" specially appointed for this parish. Similarly, pig-keeping has greatly diminished, and the condition of styres has improved of late years.

Since the date of Dr. Reece's and Mr. Fawcett's report, the following have been the number of deaths from enteric fever each year from 1901 to 1909 in the whole of Llanelly Registration Sub-district which includes Brynmawr Parish and Urban District and

Llanelly Parish of the Crickhowell Rural District, and in Llanelly Parish alone.

Year.	Enteric Fever deaths in Llanelly Registration Sub-district (population 9,909 in 1901.)			Enteric Fever deaths in Llanelly Parish (population 3076 in 1901.)	
1901	...	13	...	...	6
1902	...	5	...	...	4
1903	...	6	...	...	2
1904	...	3	...	...	2
1905	...	5	...	...	2
1906	...	5	...	...	3
1907	...	5	...	...	2
1908	...	3	...	...	3
1909	...	5	...	...	3
1901-1909		50			27

Thus, during the above period of nine years more than half the deaths from enteric fever in the whole registration sub-district of Llanelly have occurred in the Llanelly parish of the Crickhowell Rural District, though the population of this parish is less than one third that of the whole registration sub-district.

The average annual death-rate per 1000 of population in the above period was 0·5 in the whole registration sub-district and 0·9 in Llanelly parish.

Further, on comparing the number of notifications of enteric fever and of deaths in the whole of the Crickhowell Rural District and in Llanelly parish alone during 1901-1909, it is found that nearly all the notifications and all the deaths have been in Llanelly parish.

Year.			Notifications in Crickhowell R.D.	Notifications in Llanelly Parish.	Deaths in Crickhowell R.D.	Deaths in Llanelly Parish.
1901	...	...	47	46	6	6
1902	...	...	34	33	4	4
1903	...	...	12	12	2	2
1904	...	...	28	27	2	2
1905	...	...	21	21	2	2
1906	...	...	23	23	3	3
1907	...	...	7	7	2	2
1908	...	...	19	19	3	3
1909	...	...	20	19	3	3
1901-1909	...		211	207	27	27

Before discussing the reasons for this endemicity of enteric fever in and its almost exclusive incidence upon this parish, as compared with the whole rural district, it will be of advantage to draw attention to the "chief facts" reported by Dr. Reece and Mr. Fawcett after their inspection in 1901, as recorded in the "abstract of

medical inspections" in the Report of the Board's medical officer for 1901-02 (p. 131). Thus:—

"The Brynmawr Urban District Council sewage farm is in the Llanelly Division . . . of the Crickhowell Rural District; the outfall sewer from the Brynmawr Urban District traverses $2\frac{1}{2}$ miles, partly in the Rural district of Crickhowell, before reaching the farm, where the sewage has been disposed of since 1869. The sewage disposal works at Brynmawr require alteration; they are dirty and neglected. The gradient of the outfall sewer is such as probably will not discharge six times the dry-weather flow The sewer leaks in places, and the farm is badly managed, and irrigation not properly effected. As the sewer traverses the Llanelly Division of the Crickhowell Rural District, the pipes are carried roughly along the 1,000-ft. contour line. The ground slopes steeply from the pipes to the Clydach brook. Many houses in the villages of Clydach, Cheltenham and Blackrock, and as well certain springs are situate between the sewer pipes and the brook. There can be no doubt that when the sewage pipes leak they are liable to contaminate the springs, which are situate at a lower level; but the majority of these springs are also liable to be polluted from offensive privies, filthy pig-styes and manured gardens"

The facts above recorded remain substantially unaltered to-day. The sewage farm is in a very neglected condition still: its management is left to the farmer at the adjacent Rhonos farm, who appears to do what he likes, uncontrolled by the Brynmawr Urban District Council or their officers. The trenches are of rude construction, and have few, if any, lateral distributing arms. The tanks and sumps through which the sewage passes before reaching this so-called farm are very foul. A stream passing through the farm conveys almost pure sewage to the Clydach brook. Anything more unlike the plan of sewage distribution figured in Dr. Reece's and Mr. Fawcett's report than the present state of things there can hardly be conceived.

As for the outfall sewer, the gradient is still unsatisfactory. Although this sewer was relaid in 1902 for about 300 yards, it undoubtedly leaks still from time to time. Thus, at my visit, I found a leaking joint and a fracture of the sewer near it, just above Cheltenham and the Ffynnon-y-coed spring.

It may therefore be said, that both the Brynmawr sewage farm and the Brynmawr outfall sewer are still very unsatisfactory. But before concluding that these circumstances are a determining cause of the enteric fever in Llanelly parish, it will be well to consider the result of a study of this disease during 1908 and 1909, as well as any other suggested factors in its etiology.

The 38 cases notified in 1908 and 1909, of which six were fatal, occurred in 29 houses.

In 1908, one family had seven cases. In 1909, one family had two cases and another family three. These facts suggested personal infection in the three families concerned, which was supported by detailed enquiry. Not only did the disease spread in the above families in this way; but there were histories of visiting at and nursing persons in other infected families which suggested this mode of infection. As mentioned above, there is no hospital isolation whatever, and little attempt at home isolation, which would be altogether futile in the majority of instances.

Although few of the invaded houses were without some local sanitary defect, it cannot be said that these defects were markedly in excess of those obtaining generally in the district, or that they were directly concerned with the causation of the disease.

Moreover, the local insanitary conditions spoken of by Dr. Reece and Mr. Fawcett in 1901 as competing influences in contaminating certain springs have been considerably improved since their visit.

As regards seasonal incidence, 16 of the 38 cases occurred in the third quarters of the years 1908 and 1909.

With respect to age, 13 of the 38 were over 25 years of age, and only 6 between 15 and 25 years, the usual period of enteric fever age-incidence. (The numbers are, however, small.)

There was no evidence available as to "carriers," and milk, shell-fish, watercress, and celery could be excluded as factors in setting up the fever in the parish of Llanelly.

As bearing on its alleged water causation by springs contaminated by sewage from the sewage farm and the outfall sewer, I found that of the 29 invaded houses in 1908 and 1909, 15 were situated in a localised area between the farm and sewer on the north and the Clydach brook on the south, and on a much lower level than the farm and sewer, the remaining 14 being placed on the other side of the brook and in isolated positions in the parish. Further, that eight of these 15 houses, in Cheltenham and Clydach, obtained their water from the mains supplied by the Ffynnon-y-coed spring, previously mentioned, the rest being dependent on local springs near them for their supply. Further, 2 of the above-mentioned 14 isolated cases were closely related to Clydach village and probably drank water from this spring.

As regards this Ffynnon-y-coed spring at Cheltenham, not only is its water of bad repute with some of the inhabitants there, who usually boil it before drinking but Dr. Maclean Wilson, in his report of 1894, in referring to enteric fever prevalence at Cheltenham and the position of the Brynmawr sewer, wrote thus:—"The limestone rock is very porous and there is little doubt but that, in the event of any leakage from the sewer, the sewage, or part of it, must eventually find its way into the spring below." At the same time, he stated that the spread of enteric fever might be due to the insanitary environment of the dwellings at Cheltenham.

It is of some significance that, at my recent visit, I found a leak from the Brynmawr sewer just above the above-mentioned spring, a steep slope of carboniferous limestone and talus intervening between the sewer and the spring. This slope consists largely of bare loose angular fragments of rock and is very pervious to water, which may reappear as a spring where the talus rests on solid rock.

At my inspection, I was handed copies of analyses of the water of this spring in 1904, 1905, 1908 and 1909. All these analyses gave satisfactory results, except in 1905, when the analyst's conclusion from the chemical analysis (which revealed .03 parts per million of free and of albuminoid ammonia and 4.95 grains per gallon of nitrogen as nitrates) was that there was evidence of "sewage or animal contamination."

Bacteriological examination confirmed this conclusion, since the number of organisms at 20° C. were 6,900 per c.c., and the bacillus coli was present in $\frac{1}{10}$ c.c. and $\frac{1}{2}$ c.c.

The surveyor is inclined to attribute this contamination of 1905 to local insuction of sewage from a drain into a leaking water pipe. But it might well be that, if more frequent and regular analyses of

this water were made, bacteriological as well as chemical, there would be other occasions on which the water showed evidence of sewage contamination. In any case, negative analytical results count little against the positive evidence afforded by physical circumstances.

Again, as to direct contamination of local springs by the sewage farm, sewage is said by local residents to have been seen trickling down the slope between the "farm" and the Clydach brook, though I saw none at my inspection. From the general arrangement and management of the "farm," I can regard this as quite possible. The intervening porous stratum is similar in this case to that of the outfall sewer. But without doubt the Clydach brook is polluted with sewage from this "farm," through the medium of the stream above mentioned, as seen by me at my inspection.

This leads me to refer to certain other pollutions of the Clydach brook, which it is all the more important to do since the prevalence of enteric fever in the valley of this brook has been locally associated with the polluted state of the brook. There is no doubt that from Gilwern to Blackrock a good deal of house refuse gains access to this Clydach brook. Some of this is dumped directly into the stream; but most of it, being placed on the banks, gets swept into the brook during rains and floods. In addition, some slops and house sewage as well as drainage from cowsheds find their way into it; and in one place, at least, the contents of pail closets are thrown in. It should also be mentioned that the Brynmawr sewerage outfall works remain in the same unsatisfactory condition described at p. 7 of Dr. Reece's and Mr. Fawcett's report, and that a considerable amount of sewage flows from these works into the head waters of the Clydach. During times of repair of the outfall sewer, too, sewage has been purposely diverted into the brook. The Conservators of the River Usk have taken up this matter and made frequent representations to the rural district council, who have put up posters near the brook warning people not to deposit refuse in it. But it is doubtful if the condition of the brook can be sensibly improved until the scavenging arrangements are bettered, and until a system of sewerage is introduced into the Clydach valley and the Brynmawr outfall works improved. As regards causation of enteric fever by these brook conditions, though the brook was said to give off noisome emanations in the vicinity of certain of the houses invaded by this fever, such instances were comparatively rare, and I could not satisfy myself that there was any etiological relationship between the two circumstances. But this does not alter the fact of the general unsatisfactory state of the stream, nor of its ability to constitute a predisposing factor to disease. The need for improvement is therefore of urgent importance.

On a review of the above evidence, the conclusion can hardly be avoided that the exclusive and endemic incidence of fatal enteric fever in Llanelly parish of Crickhowell Rural District is in all probability partly at least related in point of causation to the leaking Brynmawr outfall sewer and neglected sewage farm. These constitute a perpetual menace to the water supply of that part of the parish between them and the Clydach brook, in which part there exist special physical facilities for the contamination of that water

supply. As bearing on the possibility of specific contamination of the water supply there by this sewer, it should be mentioned that, during the years 1901-09, the average yearly notifications of enteric fever in Brynmawr Urban District have been about 20 and the average yearly deaths 3.

The spread of the disease by personal infection cannot be excluded; but an important influence in keeping the disease going seems to be this constant liability of the water supply of part of the parish to contamination.

Attempts have been made to abandon the sewage farm. Thus, in 1906, Major Norton, one of the Board's Inspectors, held a public inquiry as to a loan for sewerage. The farm was to be given up, and septic tanks and filters were to be used. The Board asked, after the inquiry, for comparative estimates of the cost of this scheme and of a scheme to put the farm in good condition. No information as to this was forthcoming, but in 1909, Mr. Tulloch, another of the Board's Inspectors, held an inquiry as to a scheme of communication with the sewers of the Western Valleys (Monmouthshire) Sewerage Board. After some correspondence, in which the Urban District Council of Brynmawr stated that they could not come to terms with the Sewerage Board, the question has apparently dropped for the present.

It seems to be generally agreed that the scheme of joining the Sewerage Board is the best solution of the difficulty, and it would remove the danger to Llanelly parish water supply from the Brynmawr outfall sewer and sewage farm. The question is one of terms and therefore not one upon which an agreement should be impossible; could not the parties agree to refer the question to some person for settlement and to abide by his decision? In any case the matter should not rest where it is and if an agreement is in fact impossible some other arrangement for disposing of the sewage must be found without delay.

In concluding this Report, I desire to acknowledge the cordial assistance rendered by the officers of the rural district council.

RECOMMENDATIONS.

1. The powers of the Housing Acts should be put in force without delay so as to secure greater attention to dilapidated house property. Defective eavespouting, as a cause of dampness, should receive special attention.

2. Suspicious water-courses such as dip wells and springs exposed to contamination should be protected against pollution, and where it is not possible to make them safe, supplies from wholesome sources should be substituted. In Llanelly parish, in particular, the various independent local supplies of suspicious origin should give place to a general wholesome water supply, to be settled after consultation with an engineering expert.

3. Sewerage is required at Llangattock village and in the Clydach Valley in Llanelly parish. Expert engineering advice should be sought on this matter. House drainage in this parish should be improved when sewerage has been introduced.

The Crickhowell sewers need better ventilation, and the two outfalls there demand early attention with a view to prevent pollution of the river Usk.

4. Conversion of privies to water-closets (where sewers and water supply are available), or in other cases to earth closets or pail closets should be more rapid. The contents of pail closets at Llangattock should be better scavenged. Proper flushing cisterns should be provided as far as possible for closets which at present are flushed only by hand.

5. In lieu of the present contract system, the rural district council would probably find it better themselves to undertake the scavenging of house refuse in Llangattock and Llanelly parishes, and they should extend the same system to some other of the larger villages of the district.

House refuse should not be placed on the banks of streams or into them. The Clydach brook needs special attention with regard to this.

6. Bye-laws with respect to common lodging-houses should be drawn up and submitted for the Board's approval.

The present series of bye-laws with respect to slaughter-houses should be better enforced.

So should the regulations drawn up under the Dairies, Cowsheds and Milkshops Order of 1885.

Bakehouses should receive more active supervision.

7. Urban powers under section 23 of the Public Health Acts Amendment Act, 1890, should be obtained, and bye-laws with regard to the paving of back yards should be drawn up under that Act, and submitted for the Board's approval.

8. Either alone or in combination with neighbouring councils, the rural district council should provide a hospital for infectious diseases. At such a hospital a steam disinfecter should be set up, for the effectual dealing with patients' clothing and bedding, &c.

The present arrangements as to inspector of nuisances would seem to require some modification in one of the senses suggested in the report above.

R. DEANE SWEETING.





